

TO: ALL HOLDERS OF ENGINE AND WING ANTI-ICE MODULE ASSEMBLY P5-11 OVERHAUL MANUAL, 30-12-01

REVISION NO. 6, DATED NOV 1/08

HIGHLIGHTS

DESCRIPTION OF CHANGE	TOPICS AFFECTED												
	D & O	D / A s s y	C l e a n i n g	i n s p / C h k	R e p a i r	A s s y	F / C	T e s t	T / S h o o t i n g	S / T o o l s	S t o r a g e	I P L	L / O v e r h a u l
Removed BAE Systems assemblies from manual	X				X			X	X			X	

ENGINE AND WING ANTI-ICE MODULE ASSEMBLY P5-11

30-12-01

I BOEING P/N 69-68134-2

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
30-1005	PRR 31219	PRR 30355 PRR 30670 Mar 10/70	Mar 10/70 Mar 10/70
71-1034		PRR 31219K PRR 31253 PRR 31396	Mar 10/70 Mar 10/70 Mar 10/70
30-1014		MC 3510-40K	Dec 25/75
34-1130		MC 3510-53K	Dec 25/75
		MC 3999-10K	Jan 5/78 Jan 5/83

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LIST OF EFFECTIVE PAGES

* Indicates pages revised, added or deleted in latest revision
 F Indicates foldout pages - print one side only

PAGE	DATE	PAGE	DATE	PAGE	DATE
30-12-01					
* T-1	Nov 1/08				
T-2	BLANK				
* LEP-1	Nov 1/08				
LEP-2	BLANK				
* T/C-1	Nov 1/08				
T/C-2	BLANK				
* 1	Nov 1/08				
* 2	Nov 1/08				
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* 7	Nov 1/08				
* 8	Nov 1/08				
* 401	Nov 1/08				
402	BLANK				
* 701	Nov 1/08				
* 702	Nov 1/08				
* 703	Nov 1/08				
* 704	Nov 1/08				
* 801	Nov 1/08				
* 802	Nov 1/08				
* F 803	DELETED				
* 804	DELETED				
* F 805	DELETED				
* 806	DELETED				
* F 807	DELETED				
* 808	DELETED				
* F 809	DELETED				
* 810	DELETED				
* F 811	Nov 1/08				
812	BLANK				
* 1101	Nov 1/08				
* 1102	Nov 1/08				
* 1103	Nov 1/08				
* 1104	Nov 1/08				
* 1105	Nov 1/08				
* 1106	DELETED				

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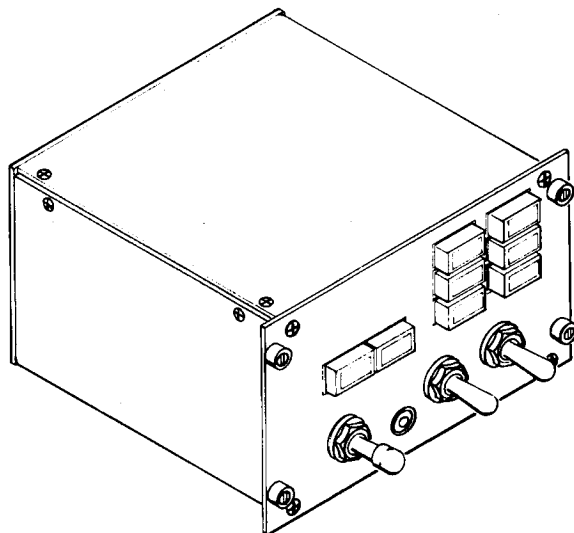
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■ * [1] Use applicable procedures in SOPM 20-11-04, OHM 31-10-01 and standard industry practices.

* [2] Special instructions not required.

ENGINE AND WING ANTI-ICE MODULE ASSEMBLY (P5-11)



Engine and Wing Anti-Ice Module Assembly (P5-11)
Figure 1

DESCRIPTION AND OPERATION

NOTE: For coverage of 69-37320-17, -18, -20, -21, -30, -36, -70, -71, -72, -73, -74, -75, refer to BAE Systems Controls Inc. (V89954 BAE Systems Controls Inc., 600 Main St., Johnson City, NY 13790) CMM 30-12-01.

1. Description

- A. The engine and wing anti-ice module assembly contains connector-mounted printed circuit assemblies, control relays, switches, and indicator lights. All components are connected by wire bundle to receptacles at the back of the unit.

2. Operation

- A. The engine and wing anti-ice module assembly functions as a control module for the anti-ice system. The system controls the flow of bleed air from the engine compressors to the engine inlet and cowl and to the wing leading edges to provide thermal ice protection. Switches and indicator lights, on the module, control and indicate the position of electrically driven valves which control the flow of air. The indicator lights have a dual function of checking valve position agreement with control switch position as well as indicating valve position.

B. The module assembly contains indicator light assemblies and switches as follows:

(1) Indicator Light Assemblies

L1 - ENG 1 LEFT VALVE OPEN

L2 - ENG 1 COWL VALVE OPEN

L3 - ENG 1 RIGHT VALVE OPEN

L4 - WING RIGHT VALVE OPEN

L6 - WING LEFT VALVE OPEN

L7 - ENG 2 LEFT VALVE OPEN

L8 - ENG 2 COWL VALVE OPEN

L9 - ENG 2 RIGHT VALVE OPEN

(2) Switches

S1 - ENG 1 ANTI-ICE CONTROL

S2 - ENG 2 ANTI-ICE CONTROL

S3 - WING ANTI-ICE CONTROL

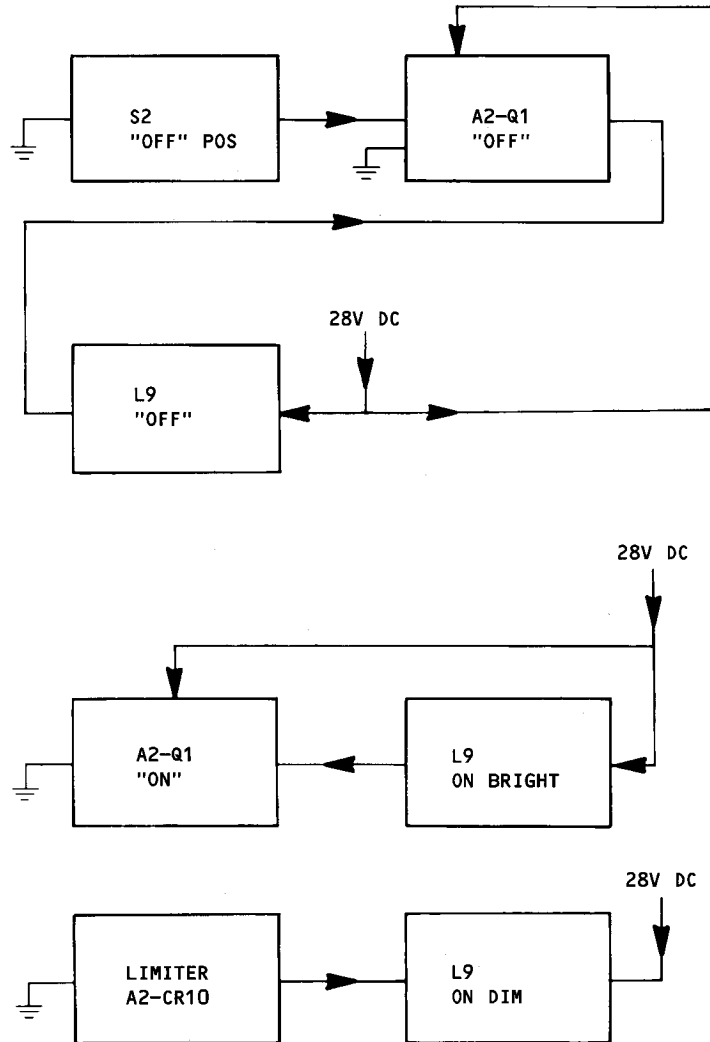
3. Functional Description (See Schematic Diagram.)

A. Indicators and Associated Circuitry (See Figures 2 and 3.)

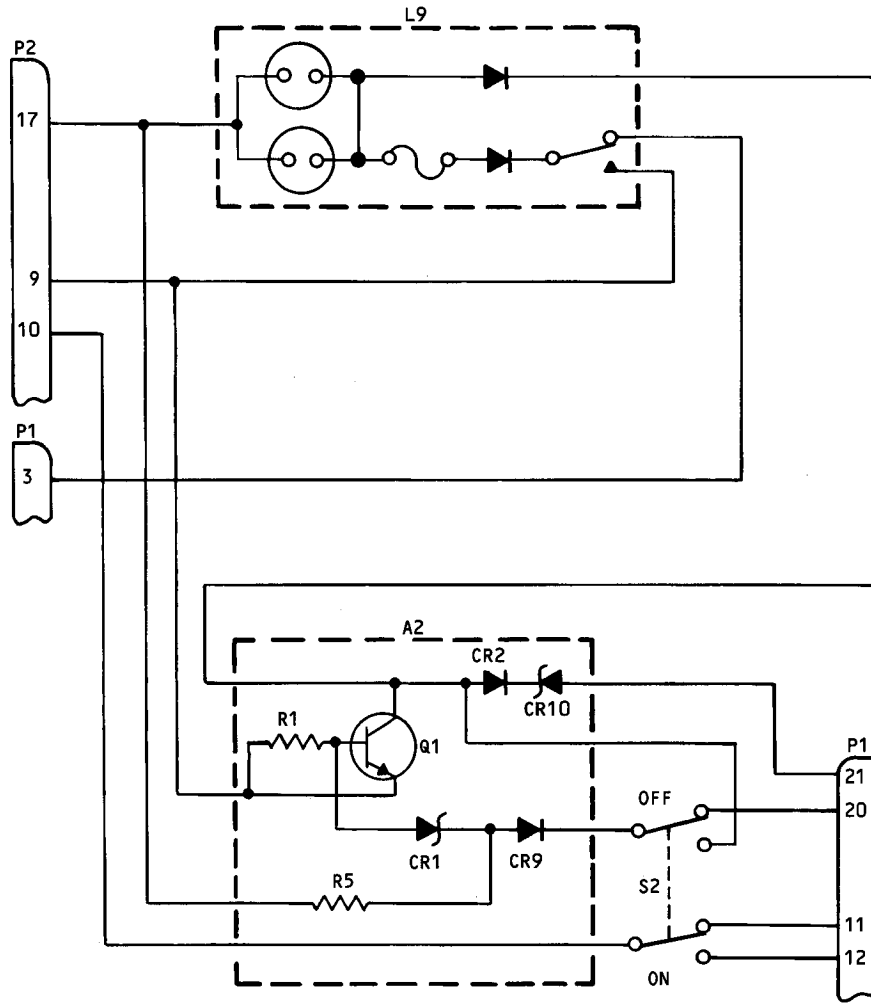
NOTE: Circuitry for all indicators on the engine and wing anti-ice module assembly are functionally identical. Therefore, only the circuitry for indicator L9 will be described.

- (1) With +28 volts dc applied to pin P2-17, ground connected to pin P2-20, and switch S2 set to OFF, transistor A2-Q1 is turned off. Indicator L9 is not grounded through A2-Q1 and is extinguished.

- (2) When S2 is set to "ON", the clamping of A2-Q1 base to ground through A2-CR1 and A2-CR9 is disconnected, and A2-Q1 is turned on by A2-R5 and A2-CR1 circuit. +28 volts dc is applied through A2-Q1 to illuminate L9.
- (3) When ground is removed from P2-20 and connected to pin P2-21, A1-Q1 is turned off and a reduced voltage, controlled by A2-CR10 through A2-CR2, is connected to L9. L9 will illuminate dimly.
- (4) Setting S2 to OFF turns on A2-Q1, through A2-R5 and A2-CR1 circuit, allowing L9 to illuminate brightly. A2-Q1 remains on until a ground is connected to pin P2-20.
- (5) With +28 volts dc applied to pin P2-17 and ground connected to pin P1-3, a current path is provided through a fuse, a diode, and normally closed contacts of a push-to-test switch to illuminate indicator L9. When ground is connected to pin P2-9, a current path is provided through a fuse, a diode, and normally open contacts of a push-to-test switch.



Indicator and Associated Circuitry Block Diagram
Figure 2



Indicator and Associated Circuitry Schematic Diagram
Figure 3

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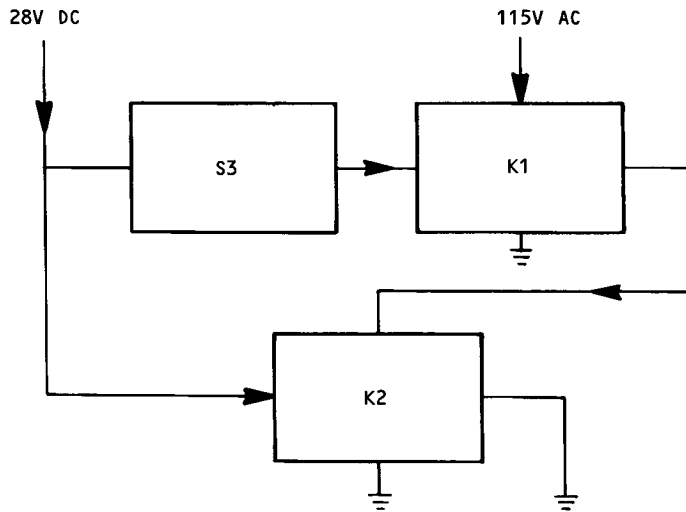
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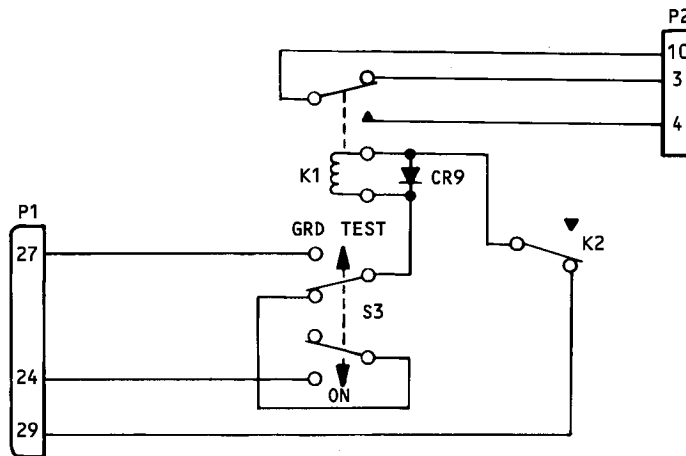
I B. Wing Thermal Anti-Ice Switching Circuitry (See Figures 4 and 5.)

NOTE: Circuitry for the left wing thermal anti-ice switching and the right wing thermal anti-ice switching are functionally identical. Therefore, only the circuitry for the left wing thermal anti-ice switching will be described.

- (1) With +28 volts dc applied to pin P1-24, ground connected to pin P1-29, and switch S3 set to "ON", relay K1 is energized to provide electrical continuity between pins P2-4 and P2-10.
- (2) Setting switch S3 to "GRD TEST" and applying +28 volts dc to pin P1-27, with ground connected to pin P1-29, energizes relay K1.
- (3) Setting switch S3 to "OFF" de-energizes relay K1, breaking electrical continuity between pins P2-4 and P2-10, and providing electrical continuity between pins P2-3 and P2-10.



Wing Thermal Anti-Ice Switching Circuitry Block Diagram
Figure 4



Wing Thermal Anti-Ice Switching Circuitry Schematic Diagram
Figure 5

4. Leading Particulars

Length -- 7 inches (approximately)
Width -- 5-3/4 inches (approximately)
Height -- 3-1/2 inches (approximately)
Weight -- 4 pounds (approximately)
Operating Voltage -- 28 volts dc

REPAIR

1. Materials

- A. Loctite sealant Type 242 or 222 without primer (Loctite Corp., 705 North Mountain Road, Newington, Connecticut 06111-1411).
- B. Enamel: Hi-speed dark gray flat Lacquer (1-1-1-703) (SOPM 20-41-01)

2. To repair the unit, you can use the standard industry practices and the procedures in SOPM 20-11-05 unless shown below.

- A. When you replace the printed circuit assembly connectors (Fig. 1101-38), install the contact keying plugs (Fig. 1101-39) at position no. 8.

- B. When you replace the baseplate assembly (Fig. 1101-19), apply loctite sealant (Type 242 or 222 without primer) to threaded parts of the screws (Fig. 1101-18) before you tighten.

NOTE: After you tighten the screws, touch up the screw heads as follow:

- Prepare the surface and apply two coats of Sherwin-Williams. Hi-speed dark gray flat Lacquer per SOPM 20-41-04.

- C. When you replace the support (Fig. 1101-29), apply loctite sealant (Type 242 or 222 without primer) to threaded parts of the screws (Fig. 1101-28) before you tighten.

- D. When you replace the indicator light series 10-61305-xxx or 10-61803-xxx, torque the mounting screws to 25-40 ounce-inches.

TESTING

1. Test Equipment
 - A. Power Supply -- 28 volt dc, 2 amperes
 - B. Multimeter -- Simpson 260, or equivalent
 - C. Test connectors with pigtail leads as follows:
 - (1) BACC45FT18-31S
 - (2) BACC45FT18-31S6
2. Functional Test (see Component Location - Fig. 703).
 - A. Verify continuity (Con) and resistance as specified in Fig. 701.
 - B. Apply +28 volts dc to pin P1-24.
 - C. Connect ground to pin P1-29.
 - D. Set switch S3 to ON.
 - E. Verify continuity between pins P2-10 and P2-4, and between pins P1-11 and P2-6.
 - F. Remove +28 volts dc from pin P1-24 and connect to pin P1-27.
 - G. Set switch S3 to GRD TEST.
 - H. Verify continuity between P1-11 and P2-6.
 - I. Connect ground to pins P1-21 and P1-29.
 - J. Verify continuity between pins P2-10 and P2-3, and between pins P1-11 and P2-5.
 - K. Remove all test connections.
 - L. Apply +28 volts dc to pins P1-18 and P2-17, connect ground to pin P1-3 and verify indicators L1 thru L4, and L6 thru L9 illuminated, and that each will extinguish when depressed.
 - M. Remove ground from P1-3 and connect to P1-29. Verify indicators L1 thru L4 and L6 illuminated, L7, L8 and L9 extinguished.
 - N. Remove +28 volts dc from pin P1-18. Connect ground to pin P2-9. Verify indicators L7, L8, and L9 illuminated, L1 thru L4 and L6 extinguished.
 - O. Connect ground to pins P1-4, P1-6, P1-8, P1-23, P1-25, P2-20, P2-22, and P2-24.

- P. Set switches S1, S2 and S3 to OFF.
- Q. Set switches to position listed, apply connections, and verify indicator conditions as specified in Fig. 702.

NOTE: All indicators extinguished except as indicated.

- R. Remove all test connections.

Component	From (+)	To (-)	S1 OFF S2 OFF S3 OFF	S1 ON S2 ON S3 ON
S1	P1-11	P1-12	Con	
S1	P1-11	P1-14	Con	
S1	P1-11	P1-16	Con	
K1	P1-11	P2-5	Con	
S2	P2-10	P2-11	Con	
S2	P2-10	P2-13	Con	
S2	P2-10	P2-15	Con	
K1	P2-10	P2-3	Con	
S1	P1-11	P1-13		Con
S1	P1-11	P1-15		Con
S1	P1-11	P1-17		Con
S2	P2-10	P2-16		Con
S2	P2-10	P2-14		Con
S2	P2-10	P2-12		Con
R2	P2-28	P2-6	100k (± 5k)	
R3	P2-16	P2-27	100k (± 5k)	
R4	P1-10	P1-13	100k (± 5k)	
110	P2-1	Rim of lightplate connector	Con	
110	P2-2	Center conductor of lightplate connector	Con	

- S. Connect ohmmeter between P1-1 and P1-2. Verify continuity when S3 is set to ON, and no continuity when S3 is set to OFF or GND TEST.

- T. Test diodes CR6 and CR7:

- (1) Verify less than 50 ohms between P1-31(+) and P1-5. Verify 100k minimum with leads reversed.
- (2) Verify less than 50 ohms between P2-31(+) and P2-25. Verify 100k minimum with leads reversed.

Continuity and Resistance Checks
Figure 701

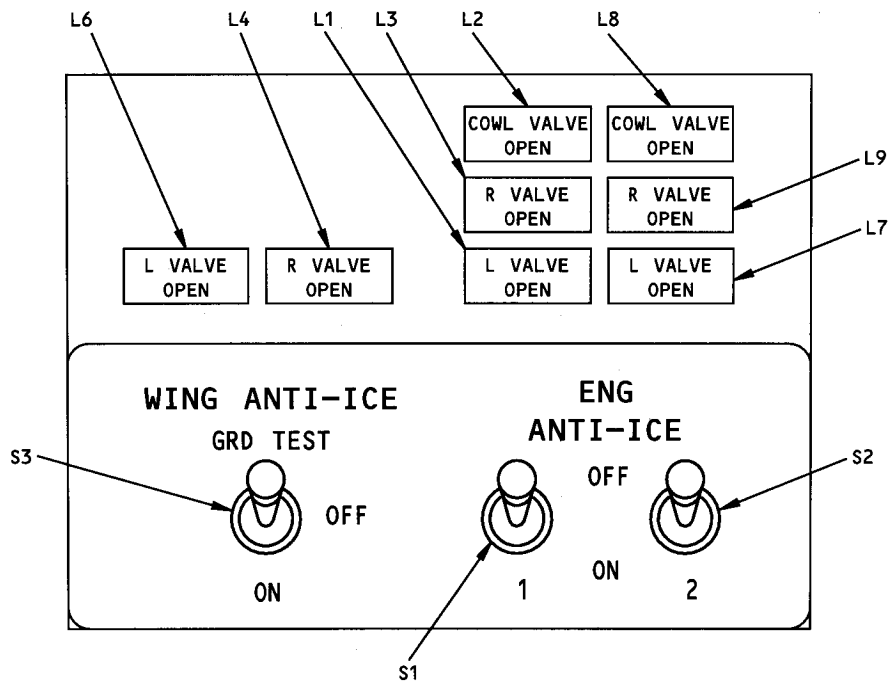
Step	Connection Point	Connect	Disconnect	Component		Indicator Illuminator
				Number	Position	
1				L9	Pressed	L9
2				L9	Released	
3				S2	"ON"	L7,L8,L9
4	P2-21	Ground		S2	"ON"	L7,L8,(L9*[1])
5	P2-21		Ground	S2	"OFF"	
6				L8	Pressed	L8
7				L8	Released	
8				S2	"ON"	L7,L8,L9
9	P2-23	Ground		S2	"ON"	L7,(L8*[1]),L9
10	P2-23		Ground	S2	"OFF"	
11				L7	Pressed	L7
12				L7	Released	
13				S2	"ON"	L7,L8,L9
14	P2-25	Ground		S2	"ON"	(L7*[1]),L8,L9
15	P2-25		Ground	S2	"OFF"	
16	P1-18	+28 v dc				
17				L3	Pressed	L3
18				L3	Released	
19				S1	"ON"	L1,L2,L3
20	P1-5	Ground		S1	"ON"	L1,L2,(L3*[1])
21	P1-5		Ground	S1	"OFF"	
22				L2	Pressed	L2
23				L2	Released	
24				S1	"ON"	L1,L2,L3
25	P1-7	Ground		S1	"ON"	L1,(L2*[1]),L3
26	P1-7		Ground	S1	"OFF"	
27				L1	Pressed	L1
28				L1	Released	
29				S1	"ON"	L1,L2,L3
30	P1-9	Ground		S1	"ON"	(L1*[1]),L2,L3
31	P1-9		Ground	S1	"OFF"	
32				L6	Pressed	L6
33				L6	Released	
34				S3	"ON"	L4,L6
35	P1-28	Ground		S3	"ON"	L4,(L6*[1])
36	P1-28		Ground	S3	"OFF"	
37				L4	Pressed	L4
38				L4	Released	
39				S3	"ON"	L4,L6
40	P1-26	Ground		S3	"ON"	(L4*[1]),L6
41	P1-26		Ground	S3	"OFF"	

*[1] Dim

Functional Test
Figure 702

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ENGINE AND WING ANTI-ICE MODULE ASSEMBLY, P5-11

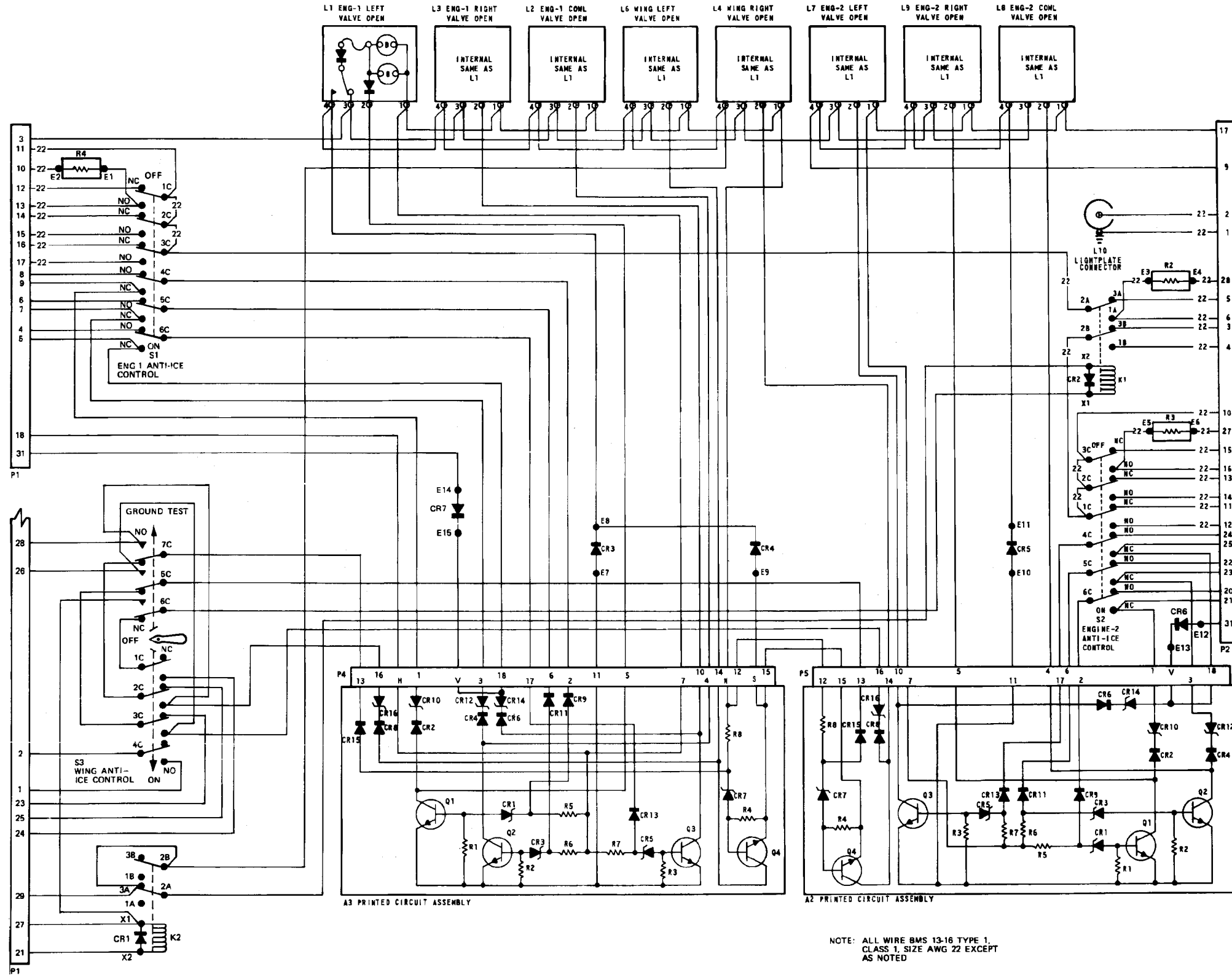
Front Panel Component Locations
Figure 703

TROUBLE SHOOTING

1. Trouble shooting is keyed to the steps of the test procedures. Paragraph and step references are to that portion of TESTING wherein the fault specified could occur. The presumption is made that when a fault indication is encountered, the results of all previous steps were normal.
2. When a fault has been isolated to a printed circuit assembly, the assembly must be repaired or replaced. Refer to Subject OHM 31-36-44.

<u>Trouble</u>	<u>Possible Cause and Corrective Action</u>
Figure 701	Component listed in Figure 701.
Paragraph 2.E. or 2.H.	S3 or K1.
Paragraph 2.J.	K1.
Indicator fails to illuminate paragraph 2.L.	Indicator not illuminated.
Indicator L1 fails to illuminate, paragraph 2.M. or Figure 702, step 29 or 30	A3Q1.
Indicator L2 or L3 fails to illuminate, Figure 702, step 29 or 30	S1 wiring.
Indicator L2 fails to illuminate, paragraph 2.M. or Figure 702, step 24 or 25	A3Q2.
Indicator L1 or L3 fails to illuminate, Figure 702, step 24 or 25	S1 wiring.
Indicator L3 fails to illuminate, paragraph 2.M. or Figure 702, step 19 or 20	A3Q3.
Indicator L1 or L2 fails to illuminate, Figure 702, step 19 or 20	S1 wiring.

<u>Trouble</u>	<u>Possible Cause and Corrective Action</u>
Indicator L4 fails to illuminate, paragraph 2.M. or Figure 702, step 39 or 40	A2Q4.
Indicator L6 fails to illuminate, Figure 702, step 39 or 40	S3 wiring.
Indicator L6 fails to illuminate, paragraph 2.M. or Figure 702, step 34 or 35	A3Q4.
Indicator L4 fails to illuminate, Figure 702, step 34 or 35	S3 wiring.
Indicator L7 fails to illuminate, paragraph 2.N. or Figure 702, step 13 or 14	A2Q3.
Indicator L8 or L9 fails to illuminate, Figure 702, step 13 or 14	S2 wiring.
Indicator L8 fails to illuminate, paragraph 2.N. or Figure 702, step 8 or 9	A2Q2.
Indicator L7 or L9 fails to illuminate, Figure 702, step 8 or 9	S2 wiring.
Indicator L9 fails to illuminate, paragraph 2.N. or Figure 702, step 3 or 4	A2Q1.
Indicator L7 or L8 fails to illuminate, Figure 702, step 3 or 4	S2 wiring.



69-68134-2
Schematic Diagram
Figure 801

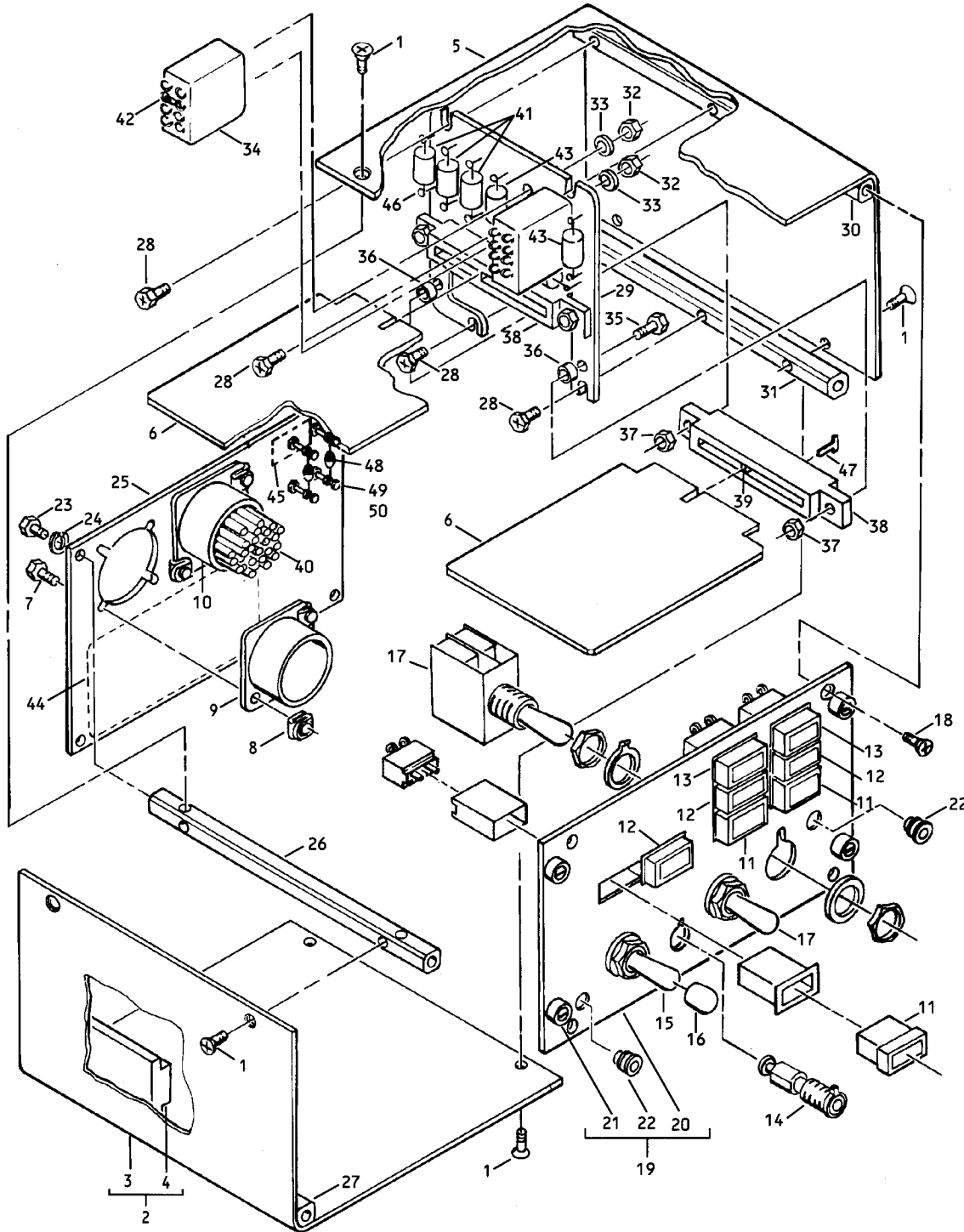
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ILLUSTRATED PARTS LIST

VENDORS

V00779	TYCO ELECTRONICS CORP., 2800 FULLING MILL RD., BLDG-38, MIDDLETOWN, PENNSYLVANIA 17057-3142
V14936	GENERAL CONDUCTOR, INC., 10 MELVILLE PARK RD., MELVILLE, NEW YORK 11747
V26742	METHODE ELECTRONICS, INC., 7401 WEST WILSON AVE., HARWOOD HEIGHTS, ILLINOIS 60706-4548
V58657	LEACH INTERNATIONAL CORPORATION, 6900 ORANGETHORPE AVE., BUENA PARK, CALIFORNIA 90620-1351
V81312	WINCHESTER ELECTRONICS, CORP., 62 BARNES INDUSTRIAL RD. N., WALLINGFORD, CONNECTICUT 06492-1846
V81590	KORRY ELECTRONIC, CO., 901 DEXTER AVE. NORTH, SEATTLE, WASHINGTON 98109-3515
V81640	EATON CORPORATION, DBA FLUID POWER DIV., 2250 WHITFIELD AVE., SARASOTA, FLORIDA 34243-3926
V91929	HONEYWELL INTERNATIONAL, INC., 11 WEST SPRING STREET, FREEPORT, ILLINOIS 61032-4316

1. Exploded View



Engine and Wing Anti-Ice Module Assembly (P5-11)
Figure 1101

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE							USE CODE	QTY PER ASSY
			1	2	3	4	5	6	7		
1101-	69-68134-2		ENGINE AND WING ANTI-ICE MODULE ASSY (P5-11) (SB 71-1034) (SB 34-1130)								
1	NAS514P440-4		. SCREW								
2	69-52014-1		. COVER ASSY (DELETED BY SB 30-1014)								1
3	69-52014-2		. . COVER (DELETED BY SB 30-1014)								1
4	69-52014-5		. . FOAM								1
5	69-52014-2		. COVER (DELETED BY SB 30-1014)								1
6	69-43412-1		. PRINTED CIRCUIT ASSY (REF 31-36-44)								2
7	BACS12CB04-5		. SCREW								4
8	BACN10NW1		. NUT, CLIP, SELF-LOCKING								4
9	BACC45FN18-31P		. CONNECTOR								1
10	BACC45FN18-31P6		. CONNECTOR								1
11	BCREF4075		. LIGHT, V81590 (319-619-1001-048) (BOEING 10-61305-68)								3
12	BCREF4076		. LIGHT, V81590 (319-619-1001-049) (BOEING 10-61305-69)								3
13	BCREF4077		. LIGHT, V81590 (319-619-1001-050) (BOEING 10-61305-70)								2
14	138-102		. CONNECTOR, POWER (PREF) (V26742)								1
14	SCN001		. CONNECTOR, POWER (OPT)								1
15	68AT22-5		. SWITCH								1
15	A3-1114-02-1		. SWITCH, V81640 (OPT) (ADDED BY SB 34-1130)								1
16	69-44578-2		. CAP								1
17	66AT11-3D		. SWITCH, V91929								2
18	NAS514P632-5		. SCREW								4
19	69-37320-13		. BASEPLATE ASSY								1
20	BACP10U0337G		. . BASEPLATE								1
21	BACS21DD1		. . STUD ASSY								4
22	BACN10PA06-6		. NUT, PRESS, SELF-LOCKING								2
23	BACS12CB065		. SCREW								4
24	MS35338-41		. WASHER								4
25	69-52014-3		. BACKPLATE								1
26	69-37268-23		. STANDOFF								1
27	69-37268-24		. STANDOFF								1
28	BACS12CB04-4		. SCREW								4
29	69-52014-4		. SUPPORT								1
29	69-52014-6		. SUPPORT								1

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE							USE CODE	QTY PER ASSY
			1	2	3	4	5	6	7		
1101-											
30	69-37320-4										1
31	69-37320-16										1
32	NAS679A06W										4
33	AN960D8										8
34	BACR13CF4										2
34	JG2A										2
35	BACS12CB06-14										4
36	NAS43DD1-17										4
37	NAS679A06W										4
38	582555-1										2
39	582507-1										2
40	69-37320-22										1
41	RC20GF104J										3
42	1N4384										2
43	1N4385										3
44	BAC27DCC233										1
45	BACM10L00-1CU										1
46	4443B9										11
47	66143-2										36
48	1N5061										2
49	1495D4										4
50	BACN10DN40										4

REFERENCE DESIGNATION INDEX (SEE SCHEMATIC DIAGRAM)		
REFERENCE DESIGNATION	PART NUMBER	ITEM NO.
A2, A3	69-43412-1	6
CR1, CR2	1N4384	42
CR3, CR4, CR5	1N4385	43
CR6, CR7	1N5061	48
K1, K2	*BACR13CF4	34
K1, K2	JG2A-005	34
L1, L6, L7	BCREF4075	11
L3, L4, L9	BCREF4076	12
L2, L8	BCREF4077	13
L10	*138-102	14
L10	SCN001	14
P1	BACC45FN18-31P	9
P2	BACC45FN18-31P6	10
P4, P5	582555-1	38
R2, R3, R4	RC20GF104J	41
S1, S2	66AT11-3D	17
S3	*68AT22-5	15
S3	A3-1114-02-1	15

* PREFERRED PART